



RTS5138

One-LUN USB 2.0 Card Reader Controller

DATASHEET

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Realtek Semiconductor Corp.

No. 2, Innovation Road II, Hsinchu Science Park, Hsinchu 300, Taiwan

Tel.: +886-3-578-0211. Fax: +886-3-577-6047

www.realtek.com.tw

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Revision History

Revision	Description	Page	Date
0.92	1. Change the pins order 2. Add the ESD and Latchup result	4,5 7	2009/4/4
0.91	Change package type from 28-QFN to 24-QFN	2,4,5,8,9,10	2009/3/18
0.9	First release		2008/9/26

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1. General Description

The RTS5138 is an ultimate throughput USB 2.0 compliant card reader controller that integrates USB 2.0 Transceiver, MCU, SIE, regulators and memory card access units into a single chip. The RTS5138 can support Memory Stick™, Memory Stick Pro™, Memory Stick PRO-HG Duo™, Secure Digital™, Multi-Media Card™ and xD-Picture Card™, but only 1-LUN configuration, i.e. only one of these memory cards can be inserted into RTS5138 system at the same time.

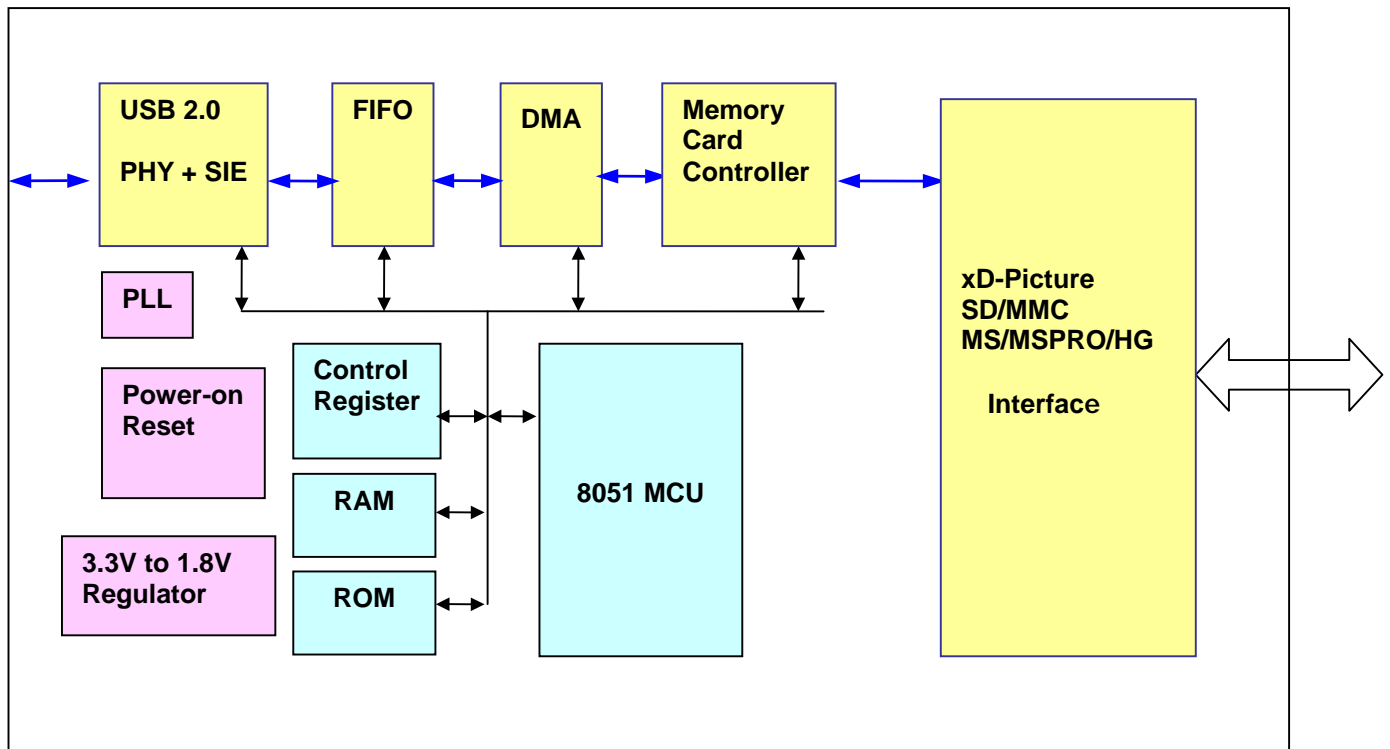
The RTS5138 integrates 3.3V-to-1.8V regulator, clock generation circuitry and MOSFET, and could dramatically reduce the system BOM cost.

2. Features

- Compliant with Universal Serial Bus Specification Revision 2.0
- Compliant with USB Mass Storage Class Bulk only Transport Specification Rev. 1.0
- Support High-speed (480Mbps) and Full-speed (12Mbps) Data Transfer
- USB bus power operation
- Support Control, Bulk IN / OUT data pipes
- Support the following memory card interfaces:
 - Secure Digital™ (SD), MultiMediaCard™ (MMC), SDHC, Mini-SD, Micro-SD (T-flash), RS-MMC, Mobile-MMC and MMC-micro
 - Memory Stick™ (MS), Memory Stick PRO™ (MS-PRO), MS Duo, MS-PRO Duo and Micro-MS (M2)
 - MSPRO-HG Duo 8-bit mode
 - xD-Picture Card™ (xD) including Type M, Type M+, and Type H
- Support hardware ECC (Error Correction Code) function
- Support hardware CRC (Cyclic Redundancy Check) function
- Programmable clock rate for flash memory card interfaces
- Support MS-PRO **v1.02**
- Support MS **v1.43**
- Support MS PRO-HG Duo **v1.01**
- Support SD version **2.0**
- Support MMC version **4.2**
- Support xD **v1.2**

- Integrated Fast 8051 microprocessor
- 48MHz directly input from clock generator
- On chip 3.3V to 1.8V regulator
- On chip MOSFET with 250mA capability for direct power control of all types memory cards
- Support Spread Spectrum Clock for SD/MMC and MS/MSPRO/HG to reduce EMI effect
- Provide Selective Suspend driver to reduce power consumption
- Support SD-Jukebox application
- 24-pin QFN package

3. Block Diagram

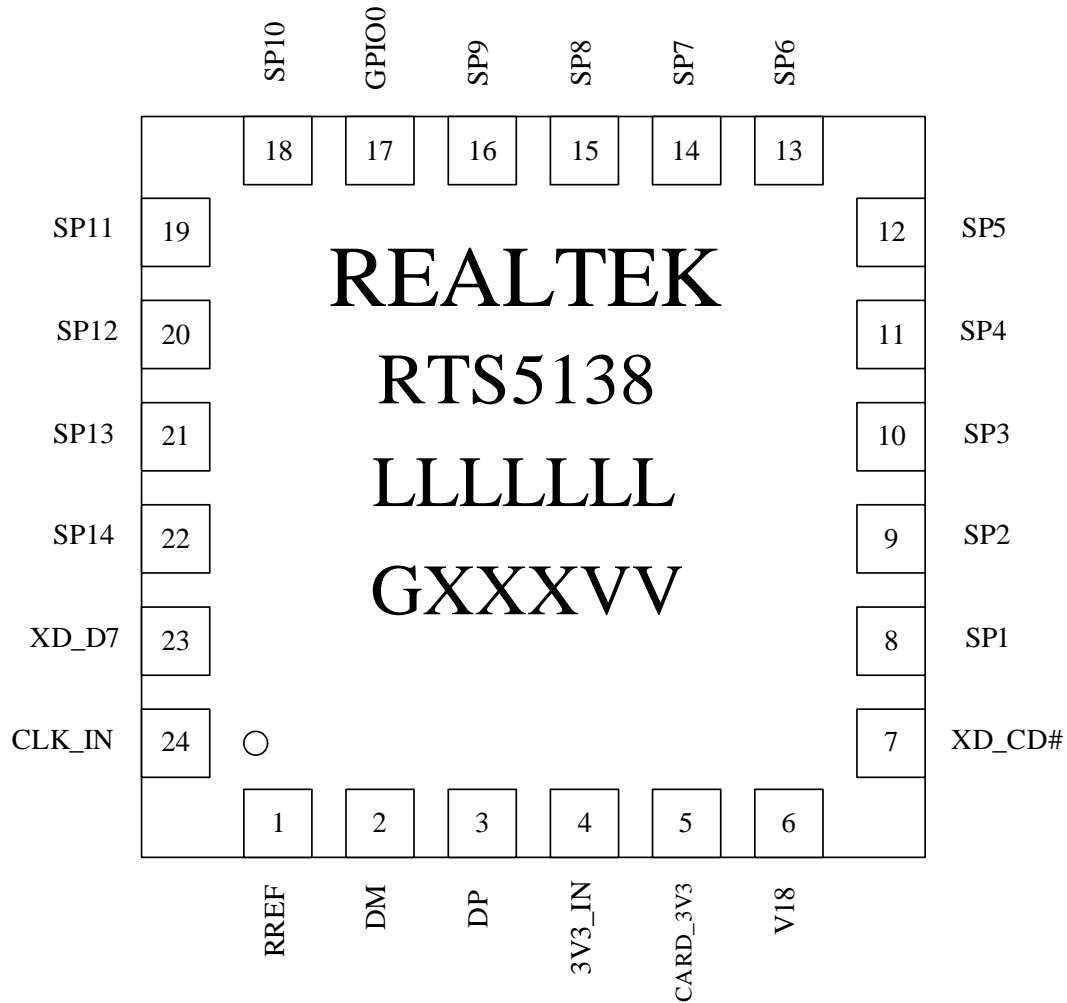


RTS5138 Block Diagram

4. Pin Descriptions

Pin#	Name	I/O Type	Description
1	RREF	I	Connect external resistor ($6.2K \pm 1\%$) to reference ground
2	DM	I/O	USB D- signal
3	DP	I/O	USB D+ signal
4	3V3_IN	I	3.3V power input
5	CARD_3V3	O	3.3V power for all cards
6	V18	O	Regulated supply voltage ($1.8V \pm 10\%$) from internal 3.3V to 1.8V regulator; supplies internal digital circuits. An external capacitance should be connected
7	XD_CD#	I	xD Card Detect (xD_CD#)
8	SP1	I/O	xD Ready Signal (xD_RDY), SD Write Protect (SD_WP) and MS Clock (MS_CLK)
9	SP2	I/O	xD RE# and MS Card Detect (MS_INS#)
10	SP3	I/O	xD CE# and SD Data 1 (SD_DAT1)
11	SP4	I/O	xD_CLE, SD Data 0 (SD_DAT0) and MS Data 7 (MS_D7)
12	SP5	I/O	xD ALE, SD Data 7 (SD_DAT7) and MS Data 3 (MS_D3)
13	SP6	I/O	xD_WE# and SD Card Detect (SD_CD#)
14	SP7	I/O	xD Write Protect (xD_WP), SD_Data 6 (SD_DAT6) and MS Data 6 (MS_D6)
15	SP8	I/O	xD Data 0 (xD_D0), SD Clock (SD_CLK) and MS Data 2 (MS_D2)
16	SP9	I/O	xD Data 1 (xD_D1), SD Data 5 (SD_D5) and MS Data 0 (MS_D0)
17	GPIO0	I/O	General purpose input/output with interrupt ability
18	SP10	I/O	xD Data 2 (xD_D2) and SD command signal (SD_CMD)
19	SP11	I/O	xD Data 3 (xD_D3), SD Data 4 (SD_DAT4) and MS Data 4 (MS_D4)
20	SP12	I/O	xD Data 4 (xD_D4), SD Data 3 (SD_DAT3) and MS Data 1 (MS_D1)
21	SP13	I/O	xD Data 5 (xD_D5), SD Data 2 (SD_DAT2) and MS Data 5 (MS_D5)
22	SP14	I/O	xD Data 6 (xD_D6) and MS BS
23	XD_D7	I/O	xD Data 7 (xD_D7)
24	CLK_IN	I	48MHz clock directly input

5. Pin Assignment



The version number is shown in the location marked 'VV' and G means Green Package

6. Card Power Switch

RTS5138 integrates all MOSFET components to supply and switch power for xD-Picture, SD/MMC, MS/MSPRO/Duo-HG cards.

The maximum range of the PMOS output current

- 1. xD-Picture Card: 250mA**
- 2. SD/MMC Card: 250mA**
- 3. MS/MSPRO/Duo-HG: 250mA**

7. Electrical Characteristics

7.1 Absolute Maximum Ratings

Parameter	Rating
Supply Voltage	−0.5V to +3.6V electrical characteristics
Operating Temperature	0°C to +70°C
Latchup Current	400 mA
Electrostatic Discharge	5 kV

7.2 DC Characteristics

Symbol	Description	Conditions	Min.	Typ.	Max.	Unit
V _{DD}	Supply Voltage		3.0	3.3	3.6	V
V _{IH}	Input Voltage High		2			V
V _{IL}	Input Voltage Low				0.8	V
V _{OH}	Output Voltage High		85% * V _{DD}			V
V _{OL}	Output Voltage Low				0.4	V
C _{in}	Input Pin Capacitance				10	pF
I _{DD}	Supply Current	8051 is running @ 6MHz (Without memory card)				mA
I _{SUS}	Suspend Current	D+ 1.5KΩ resistor is included				uA

SYMBOL	DIMENSION (MM)			DIMENSION (MIL)		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.80	0.85	0.90	31.5	33.5	35.4
A1	0	0.02	0.05	0	0.79	1.97
A3	0.203 REF			8 REF		
b	0.18	0.25	0.30	7.09	9.84	11.81
D	3.90	4.00	4.10	153.5	157.5	161.4
D2	1.90	2.00	2.10	74.8	78.7	82.7
E	3.90	4.00	4.10	153.5	157.5	161.4
E2	1.90	2.00	2.10	74.8	78.7	82.7
e	0.50 BSC			19.69 BSC		
L	0.30	0.40	0.50	11.8	15.7	19.7

NOTE:

1. DIMENSIONING AND TOLERANCING CONFORM TO ASME Y14.5M-1994.
2. REFER TO JEDEC STD. MO-220
3. DIMENSION "b" APPLIES TO METALLIZED TERMINAL AND IS MEASURED BETWEEN 0.25 AND 0.30mm FROM TERMINAL TIP.
4. LEADFRAME MATERIAL IS OLIN194 AND THICKNESS IS 0.203mm (8 MIL)

9. Ordering Information

Part Number	Package	Status
RTS5138-GR	QFN 24-pin Green package	Available

Realtek Semiconductor Corp.

Headquarters

1F, No. 2, Innovation Road II, Hsinchu Science Park,
Hsinchu 300, Taiwan.

Tel: 886-3-5780211 Fax: 886-3-5776047

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